TERRESTRIAL
ENERGY USA

February 9, 2024

Project Number: 99902076
TEUSA Letter: #240209

US Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: Submittal of Revision 2 of Technical Report on Uncertainty Quantification Methodology for Calculation of IMSR Off-Gas Source Term

Please find attached a revised technical report titled, "Uncertainty Quantification Methodology for Calculation of IMSR Off-Gas Source Term - Rev 2." This report is being provided to the NRC for their information and will be a necessary reference document to support the continued development of the off-gas source term for the IMSR. TEUSA is not requesting review or feedback on this report at this time as this report will be used as a substantial reference in the future topical report on IMSR source terms. However, TEUSA is available to answer any questions that the NRC may have related to this updated report.

This technical report contains a methodology for performing uncertainty quantification analysis for the IMSR source term based on coupled modeling of neutronics, thermal hydraulics, nuclide mass transport, and chemical speciation. The contents of the report were prepared as part of a cost-shared project funded by TEUSA and the US Department of Energy under Funding Opportunity Number DE-FOA-1817 – "U.S. Industry Opportunities for Advanced Nuclear Technology Development." The project is led by TEUSA with Oak Ridge National Laboratory (ORNL) and the University of South Carolina (USC) participating as collaborators. The result of this effort will be a general, coupled, modeling capability for molten salt reactor systems, including the capability to propagate uncertainties in model input parameters for purposes of mass accountancy and the calculation of source term. This capability will be applicable to the fluoride fuel salt of the IMSR and will be useful in the analysis of off-gas release during steady-state and accident scenarios.

The NRC provided feedback on Revision 1 of this report in October 2023 and met with TEUSA in November 2023 on the proposed resolution of the NRC feedback. Rev 2 of this report was prepared by TEUSA with the assistance of ORNL and USC.

Portions of the enclosed technical report are proprietary, and TEUSA requests that it be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390. Enclosure 1 provides the proprietary version of the technical report and Enclosure 2 provides the non-proprietary version. An affidavit supporting the withholding request is provided in Enclosure 3.

If you have any questions or need any additional information, please contact Daniel Carleton by email at dcarleton@terrestrialusa.com or by phone at 646-687-8212 ext. 533.

Sincerely,

David Hill
Chief Technology Officer
Terrestrial Energy USA

Enclosures:

Enclosure 1: "Uncertainty Quantification Methodology for Calculation of IMSR Off-Gas Source Term – Revision 2" (Proprietary)

Enclosure 2: "Uncertainty Quantification Methodology for Calculation of IMSR Off-Gas Source Term – Revision 2" (Non-Proprietary)

Enclosure 3: Affidavit Supporting Request for Withholding from Public Disclosure

CCs

Mo Shams, Director - Division of Advanced Reactors and Non-Power Production and Utilization Facilities (DANU) – Office of Nuclear Reactor Regulation (NRR)

Michael Wentzel, Branch Chief - Advanced Reactor Licensing Branch 2 - DANU–NRR

Lucieann Vechioli Feliciano, Project Manager - Advanced Reactor Licensing Branch 2 – DANU-NRR